
Transfer of Madagascan *Glochidion* to *Phyllanthus* (Euphorbiaceae s.l. or Phyllanthaceae)

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ABSTRACT. Seven endemic Madagascan species previously assigned to the genus *Glochidion* J. R. & G. Forster by Leandri are re-examined morphologically and found to belong to *Phyllanthus* L. (Euphorbiaceae s.l. or Phyllanthaceae). As a consequence, the following five new combinations are made: *Phyllanthus ankaratrae* (Leandri) Petra Hoffmann & McPherson, *P. humbertii* (Leandri) Petra Hoffmann & McPherson, *P. lichenisilvae* (Leandri) Petra Hoffmann & McPherson, *P. marojejiensis* (Leandri) Petra Hoffmann & McPherson, and *P. perrieri* (Leandri) Petra Hoffmann & McPherson.

Key words: Euphorbiaceae, *Glochidion*, Madagascar, *Phyllanthus*.

The Euphorbiaceae–Phyllanthoideae volume of the *Flore de Madagascar et des Comores* (Leandri, 1958) treated seven species in the genus *Glochidion* J. R. & G. Forster, distinguishing them from *Phyllanthus* L. by their reduced, or small and entire styles. Leandri described the first of these seven species, *G. perrieri*, in 1934 and placed it in section *Heteroglochidion* Müller Argoviensis. This section is typified by the New Caledonian species *G. baladensis* (Baillon) Müller Argoviensis, which has long, free styles and is today again considered a species of *Phyllanthus* (Schmid & McPherson, 1991). In 1937, Leandri described *G. lichenisilvae* and transferred two of his own *Phyllanthus* species, *P. oreichtitus* and *P. sambiranensis*, to *Glochidion*. Three further species, *G. ankaratrae*, *G. humbertii*, and *G. marojejiense*, were described in 1957 (Leandri, 1957).

Glochidion and *Phyllanthus* are both members of subtribe Flueggeinae (tribe Phyllanthae), the largest and most difficult group in subfamily Phyllanthoideae, or family Phyllanthaceae sensu APG (e.g., Savolainen et al., 2000, Chase et al., 2002). The last complete treatment of this group at species level was published by Müller Argoviensis (1866),

who combined *Glochidion* with *Phyllanthus*. Bentham and Hooker (1880) followed Müller in this but most later authors (e.g., Hooker, 1887, Pax & Hoffmann, 1931, Webster, 1994, Radcliffe-Smith, 2001) have regarded *Glochidion* as a separate genus.

Phyllanthus is an extremely diverse pantropical group of ca. 800 species that may not be monophyletic (Webster, 1994, Wurdack et al., in prep.). Molecular analyses are under way as a collaboration between the University of Vienna and the Royal Botanic Gardens, Kew, to shed light on the position of *Glochidion*, which Webster (1994: 46) considered to “represent a specialized offshoot from ancestral taxa within *Phyllanthus*.” *Glochidion* is generally recognized as being restricted to Asia and Australasia (Webster, 1994), sometimes with the exception of the Madagascan species (Radcliffe-Smith, 2001).

Webster (1994) and Radcliffe-Smith (2001) distinguished the two genera mainly on the basis of the following characters: floral disc (usually present in *Phyllanthus*, totally absent in *Glochidion*) and seed morphology (dry and not ventrally invaginated in *Phyllanthus*, usually fleshy (with sarcotesta) and ventrally invaginated in *Glochidion*). Stuppy (1996) confirmed the importance of seed characters in separating the two taxa.

Examination of the material in Paris (including all types) showed that all seven Madagascan species must be referred to *Phyllanthus* on the basis of both disc and (where available) seed characters. Brunel (1987) was the first to come to this conclusion when examining *Glochidion oreichtitum* and *G. sambiranense*. He found the pollen of these two species to be tricolporate whereas *Glochidion* has stephanocolporate pollen (Webster, 1994). Brunel suggested an affinity with *Phyllanthus* subg. *Kirganelia* for the species with free stamens, and with *Phyllanthus* subg. *Gomphidium* for the species with con-

nate androecia. He did not, however, study any of the species without valid names in *Phyllanthus*.

While *Glochidion oreichtitum* and *G. sambiranense* were previously published as *Phyllanthus* and have valid combinations in that genus, the remaining five species have no valid names outside *Glochidion*. We were first presented with this problem when identifying Euphorbiaceae collections (cited below under the respective species) made during the recently published botanical inventory (Gautier, 2002) of the Réserve Spéciale de Manongarivo by the Conservatoire et Jardin Botaniques de la Ville de Genève (G). We again encountered the problem while reviewing the Euphorbiaceae chapter in the *Generic Tree Flora of Madagascar* (Schatz, 2001), and when preparing an overview of the Euphorbiaceae of Madagascar for the *Natural History of Madagascar* (Hoffmann & McPherson, 2003).

To correct the false impression that the Asian and Australasian genus *Glochidion* is present in Madagascar, we propose the following new combinations. This paper is intended to clarify the generic boundaries and to make information on the species concerned available to researchers outside the Paris Herbarium. Where necessary, lectotypification will be undertaken in the course of a postgraduate study currently in progress at the University of Antananarivo and the Royal Botanic Gardens, Kew, that will result in a full taxonomic revision of Madagascan *Phyllanthus*.

Phyllanthus ankaratrae (Leandri) Petra Hoffmann & McPherson, comb. nov. Basionym: *Glochidion ankaratrae* Leandri, Mém. Inst. Sci. Madagascar, Sér. B, Biol. Vég. 8: 214. 1957. TYPE: Madagascar. Environs d'Ambositra, forêt de Ranomena, *H. Humbert & C. F. Swingle 4845* (MO, P).

Known from the type only.

Phyllanthus humbertii (Leandri) Petra Hoffmann & McPherson, comb. nov. Basionym: *Glochidion humbertii* Leandri, Mém. Inst. Sci. Madagascar, Sér. B, Biol. Vég. 8: 215. 1957. TYPE: Madagascar. Pentes orientales du Massif du Marojejy (Nord-Est), à l'ouest de la rivière Manantenina, affluent de la Lokoho, forêt ombrophile sur latérite de gneiss, ± 1450 m, *H. Humbert 22495* (MO, P).

Known from the type only.

Phyllanthus lichenisilvae (Leandri) Petra Hoffmann & McPherson, comb. nov. Basionym: *Glochidion lichenisilvae* Leandri, Notul. Syst. (Paris) 6: 29. 1937. TYPE: Madagascar. Mont Tsaratanana, 2000 m, silve à lichens, *H. Perrier de la Bâthie 16414* (P).

Known from the type only.

Phyllanthus marojejiensis (Leandri) Petra Hoffmann & McPherson, comb. nov. Basionym: *Glochidion marojejiense* Leandri, Mém. Inst. Sci. Madagascar, Sér. B, Biol. Vég. 8: 215. 1957. SYNTYPES: Madagascar. Sommet oriental du Massif de Marojejy (Nord-Est) à l'ouest de la haute Manantenina, affluent de la Lokoho, 1850–2137 m, gneiss et quartzite, dans la végétation ericoïde, *H. Humbert 22761* (MO, P); Vallée de la Lokoho (nord-est): mont Beondroka au nord de Maroambihy, 1400–1450 m, rochers de la crête (gneiss et quartzite), *H. Humbert 23608* (P).

Known from the types only.

Phyllanthus perrieri (Leandri) Petra Hoffmann & McPherson, comb. nov. Basionym: *Glochidion perrieri* Leandri, Bull. Soc. Bot. France 81: 606. 1934. TYPE: Madagascar. Massif de Manongarivo, 800–1000 m, bois humides, *H. Perrier de la Bâthie 9918* (P).

Selected further collections. MADAGASCAR. **Antsiranana Province:** Réserve Spéciale de Manongarivo, Bekolosy, 14°02'S, 48°18'E, vallon en amont de la chute de la rivière Bekolosy, 1100 m, *Derleth 117* (G, K, MO); Réserve Spéciale de Manongarivo, Besinkara, 14°04'S, 48°17'E, Ambalafary, 500 m en-dessous du hameau, 300 m, *Gautier & Chatelain 2326* (G, K, MO); Réserve Spéciale de Manongarivo, Besinkara, 14°04'S, 48°17'E, Ambalafary, 250 m, *Gautier 3009* (G, MO); Réserve Spéciale de Manongarivo, above Ambodisakoana, 1100–1200 m, *McPherson & van der Werff 16407* (MO, TAN).

As mentioned above, two of the species listed under *Glochidion* by Leandri (1958) do not need new combinations because Leandri had initially published them in *Phyllanthus*. One of them was first published under the illegitimate name *P. monticola* (1934) but given a nomen novum, *P. oreichtitus*, a year later. The correct citations are as follows:

Phyllanthus oreichtitus Leandri, Cat. Pl. Madag., Euphorb.: 24. 1935. Replaced name: *Phyllanthus monticola* Leandri, Bull. Soc. Bot. France 81: 450. 1934, nom. illeg., non *Phyllanthus monticola* Hutchinson & Dalziel. 1928. *Glochidion oreichtitum* (Leandri) Leandri, Notul. Syst. (Paris) 6: 29. 1937. SYNTYPES: Centre: Andringitra, forêt à mousses et sous-bois herbacé vers 1800 et 2000 m, H. Perrier de la Bâthie 13670 (P), same locality and collector 14406 (P).

Selected further collections. MADAGASCAR. **Antsiranana Province:** Réserve Spéciale de Manongarivo, Ambahatra, cours supérieur, 13°59'S, 48°26'E, au bord du bras de l'Ambahatra, 900 m à l'W du point côté 1037, 700 m, Gautier et al. 3499 (G, K, MO). **Antananarivo Province:** 30 km N of Ankazobe, 18°15'S, 47°09'E, remnant patches of plateau forest, 850 m, Miller & Phillipson 3717 (K, MO).

Phyllanthus sambiranensis Leandri, Bull. Bot. Soc. France 81: 451. 1934. *Glochidion sambiranense* (Leandri) Leandri, Notul. Syst. (Paris) 6: 29. 1937. SYNTYPES: Centre, Haut Bassin du Sambirano, 500 m, quartzites, rocailles, H. Perrier de la Bâthie 9698 (P); Sources d'Andraronga, versant NE, 1200 m, rocailles, quartzites, H. Perrier de la Bâthie 9728 (P); Massif de Manongarivo, 1000 m, bois sec, grès liasiques, H. Perrier de la Bâthie 9917 (P).

Selected further collections. MADAGASCAR. "Chiefly from North-West Madagascar," Baron 5625 (K). **Antsiranana Province:** Réserve Spéciale de Manongarivo, Belokosy, 14°02'S, 48°18'E, Crête 1 km du sommet, 1390 m, Gautier & Chatelain 2714 (G, K, MO); Réserve Spéciale de Manongarivo, Belokosy, 14°02'S, 48°18'E, sommet du Belokosy, 1490 m, Gautier & Derleth 2568 (G, K, MO); Réserve Spéciale de Manongarivo, Ambahatra, cours supérieur, 13°59'S, 48°26'E, crête entre les deux bras de l'Ambahatra, crête principale, 200 m au NNE du point côté 1037, Gautier et al. 3489 (G, K, MO).

Evaluation of these seven taxa is made difficult by the scarcity of material. Because very few specimens exist outside the Paris herbarium, the main characters are briefly described here. They are woody plants with triangular, non-auriculate cataphylls. All except for *Phyllanthus oreichtitus* are completely glabrous. Leaf shape and size vary greatly between the species, from large (up to 9 × 4 cm) ovate leaves in *P. humbertii* to small (ca. 0.5 × 0.15 cm), falcate leaves in *P. marojejiensis* that give the plant a distinctly ericoid habit. All seven species are monoecious; the cymules are bisexual (*P. humbertii*), or unisexual with staminate and pistillate flowers found on separate branches (*P. sam-*

biranensis) or the same branch (remaining five species).

The number of sepals in African *Phyllanthus* is usually stable and of diagnostic value (cf. Keay, 1958: 384). Brunel (1987) used this character to define infrageneric groups (series) in *Phyllanthus*. Of the seven species in question, *Phyllanthus oreichtitus* always has six sepals, *P. ankaratrae* has five sepals in staminate and six sepals in pistillate flowers, and the remaining species have five sepals in both sexes. The shapes of the staminate sepals and disc are similar in all seven species; discrete alternisepalous disc glands are always developed.

Androecium morphology divides the seven species under consideration in two groups. The first group comprises *Phyllanthus ankaratrae*, *P. humbertii*, *P. lichenisilvae*, and *P. marojejiensis* with completely connate stamens, and in this way resembles true *Glochidion*. *Phyllanthus ankaratrae* and *P. humbertii* have three stamens with non-apiculate anthers, whereas the androecium of *P. lichenisilvae* consists of four stamens with a central apiculum, and *P. marojejiensis* has five stamens with individual apicula. The remaining three species have free stamens, numbering five in *P. perrieri* and *P. sambiranensis*, and six in *P. oreichtitus*. Anthers are much longer than wide in all species and always dehisce longitudinally.

Pistillate pedicels of these seven species vary greatly in length from 1 to 15 mm. The pistillate disc is extremely reduced to lacking (*Phyllanthus ankaratrae* and *P. humbertii*), distinct and annular-pentagonal (*P. lichenisilvae*), irregularly dissected (*P. oreichtitus*), or consists of discrete, minute alternisepalous lobes (*P. marojejiensis*, *P. perrieri*, and *P. sambiranensis*). The ovary is uniformly glabrous and three-locular.

Great variation is found in styles and stigmas. *Phyllanthus perrieri* stands out in having erect, terete, entire styles up to 1.5 mm long that appear to be fused at least apically. It was the first Madagascan species to be described as *Glochidion* (Leandri, 1934), mainly because of the fused styles, as is the case in true *Glochidion*. The styles and stigmas of the remaining six species classified as *Glochidion* by Leandri (1958) are free and no more than 0.5 mm long, and of two principal shapes. In the first three species of this group, the short styles are more or less terete and bifid. In *P. ankaratrae* and *P. oreichtitus* they are inserted centrally and are apically reflexed, whereas the styles of *P. lichenisilvae* arise off-center and lean inward. In the remaining three species under consideration the styles seem to be reduced and there are three rather large, entire, flat stigmas. In *P. humbertii* and *P. marojejiensis*

sis these arise centrally and are spread flat against the ovary, whereas *P. sambiranensis* has similar but excentric, inward-leaning stigmas.

Fruits and seeds are unknown in *Phyllanthus ankaratrae* and *P. lichenisilvae*, and no seed has been seen of *P. marojejiensis*. Where known, fruits are smooth capsules, and the seeds are uniformly triquetrous with a distinct elliptical, usually slightly impressed but not invaginated chalaza and a smooth dry seed coat.

It is obvious from this morphological discussion that the Madagascan species of *Phyllanthus* united by Leandri as *Glochidion* show considerable diversity. They represent distinct species with unique combinations of characters although the distinctiveness of the infraspecific entities *G. oreichtitum* subsp. *tsaratanense* Leandri and *G. sambiranense* var. *trapezophyllum* Leandri is questionable.

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